Promises and challenges of generative artificial intelligence for human learning

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Abstract

Generative artificial intelligence (GenAI) holds the potential to transform the delivery, cultivation and evaluation of human learning. Here the authors examine the integration of GenAI as a tool for human learning, addressing its promises and challenges from a holistic viewpoint that integrates insights from learning sciences, educational technology and human–computer interaction. GenAI promises to enhance learning experiences by scaling personalized support, diversifying learning materials, enabling timely feedback and innovating assessment methods. However, it also presents critical issues such as model imperfections, ethical dilemmas and the disruption of traditional assessments. Thus, cultivating AI literacy and adaptive skills is imperative for facilitating informed engagement with GenAI technologies. Rigorous research across learning contexts is essential to evaluate GenAI's effect on human cognition, metacognition and creativity. Humanity must learn with and about GenAI, ensuring that it becomes a powerful ally in the pursuit of knowledge and innovation, rather than a crutch that undermines our intellectual abilities. This Perspective describes the roles of generative AI in providing personalized support, diversity and innovative assessment in learning. However, it also raises ethical concerns and highlights issues such as model imperfection, underscoring the need for AI literacy and adaptability.